

October 21, 1997

Dr. Martha A. Krebs, Director
Office of Energy Research
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Dear Dr. Krebs:

This letter is an interim response to your charge of September 23, 1996, expanded in your letter of May 19, 1997, regarding the level and nature of U.S. participation in the International Thermonuclear Experimental Reactor (ITER) construction, if the ITER parties decide to go forward, as well as the expanded charge to consider the U.S. role in a transition period between the EDA and construction.

To assist FESAC in answering your charges, I formed an expert Panel chaired by Dr. Hermann Grunder, Director of the Thomas Jefferson National Accelerator Facility. A list giving the membership of the Panel is enclosed. This Panel has provided FESAC with the attached interim report. The FESAC compliments the Panel and its chairman for producing a thoughtful and searching report on a complex subject. The FESAC endorses the strategic plan of the Grunder Panel and makes comments on it below.

The FESAC was fortunate to receive, in addition, the executive summary of the President's Committee of Advisors on Science and Technology (PCAST) "Federal Energy Research and Development for the Challenges of the Twenty-First Century." We also heard a presentation from Dr. Robert Conn who participated in the PCAST study. The section (enclosed) on "Challenges and Opportunities: Fusion" was very important in our deliberations. Finally, we had the benefit of public comment.

FESAC would like to emphasize the significance of ITER's impact over the past decade. By working collaboratively, the ITER partners (European Union, Japan, Russia, and the U.S.) have benefited immensely through cost sharing and program focus. It is desirable to continue this process of international collaboration, as the Grunder Panel stated: "If a decision to construct ITER were being sought today, this Panel would recommend U.S. participation at an appropriate level." Similarly, PCAST recommended that if "any of the parties states its intention to offer a site for ITER in the next year or two, the US should be prepared to continue and to maximize its participation in ITER."

The U.S. Fusion Energy Sciences Program is focused on the scientific foundations that underpin the fusion process. The three specific objectives of the program, as identified in the 1996 FEAC Report are: (1) advance plasma science in pursuit of national science and technology goals, (2) develop fusion science, technology, and plasma confinement innovations, and (3) pursue fusion energy science & technology as an international partner. This "three-leg" strategy has been endorsed by the fusion community, Congress, and the Department of Energy.

In response to the charge regarding the criteria for a decision on the level and nature of U.S. participation in the ITER construction, FESAC supports the central recommendation of the Grunder Panel: "In concert with our international partners, a burning plasma facility should be built at the earliest possible time." This recommendation should have priority as our vital interest in entering ITER negotiations. In the context of a Fusion Energy Sciences budget totaling \$250 million, we believe that an appropriate FY 1999 funding level for the activities which are in direct support of the central recommendation is approximately 20% of that total.

In response to the charge regarding the possible scenarios for U.S. participation in ITER activities, FESAC commends the Grunder Panel for its realistic assumptions regarding future funding profiles. It also notes that the Grunder Panel concentrated its findings on the nearer term transition phase.

The Panel concluded that it could best fulfill its responsibility under this by considering the ITER charge within the fusion energy science and technology portion of the U.S. program.

The FESAC agrees with the Grunder Panel recommendation that the content and balance of the ITER activities should be restructured during the transition phase. The baseline design is well advanced, much of the dedicated R&D in support of it will be completed by the end of the EDA, and site-specific work does not involve a U.S. site. FESAC therefore accepts the Grunder Panel suggestion that U.S. participation in ITER's joint work on the baseline design proceed at a lower level during the transition phase.

The FESAC agrees with the Grunder Panel that "Given the present situation where construction commitments have not been secured for the full mission ITER device... it is prudent...to examine options that involve reconsideration of the fundamental trade-offs between cost, risk and mission." In view of the cost of burning plasma experiments, such examination should be conducted with our international partners and if possible, within the ITER framework.

The FESAC concurs with the Grunder Panel recommendation that the fusion energy technology effort be restructured to support the energy objective of the program more broadly. Much of the U.S. fusion technology effort has been subsumed under ITER during the past five years. It has also largely been of a dual use nature, to meet the needs of ITER and those of the general U.S. fusion program. The FESAC agrees that this dual use aspect should be the focus, and the U.S. industry involvement in fusion technology should continue.

In the spirit of the Grunder Panel's suggestion "that the US explore with our [international] colleagues the possibility for increased collaboration in JET [and] JT-60U," FESAC recommends a vigorous experimental program aimed at burning plasma physics issues as well as the physics basis for possible cost reduction through plasma optimization. Such a program should take advantage of domestic devices such as DIII-D and C-Mod and the U.S. fusion theory program, in addition to international experimental collaboration.

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Finally, to act on the central recommendation of the Grunder Panel, and consistent with the PCAST recommendation, FESAC considers it critically important that DOE enter future international negotiations with a high level, long-range commitment to support a “next step facility aimed at a mutually agreed upon set of scientific objectives,” as stated by PCAST.

Sincerely,

John Sheffield, Chair
on behalf of the Fusion Energy
Science Advisory Committee

Enclosures

cc: N. A. Davies, DOE-OFES
FESAC
H. Grunder, TJNAF